

Final draft **ETSI EN 301 908-5** V1.1.1 (2001-11)

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*Candidate Harmonized European Standard (Telecommunications series)*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Base Stations (BS) and User Equipment (UE) for  
IMT-2000 Third-Generation cellular networks;  
Part 5: Harmonized EN for IMT-2000, CDMA Multi-Carrier  
(cdma2000) (BS) covering essential requirements  
of article 3.2 of the R&TTE Directive**

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**Reference**

DEN/ERM-TFES-001-5

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**Keywords**

3G, 3GPP2, cdma2000, cellular, digital, IMT-2000, mobile, radio, regulation, UMTS

**ETSI**

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## Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document is part 5 of a multi-part deliverable covering the Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

- Part 1: "Harmonized EN for IMT-2000, introduction and common requirements, covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";**
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 7: "Harmonized standard for IMT-2000, CDMA TDD (UTRA TDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 8: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 9: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 10: "Harmonized EN for IMT-2000 FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive".

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC are given in annex A.

**Proposed national transposition dates**

Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

## Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

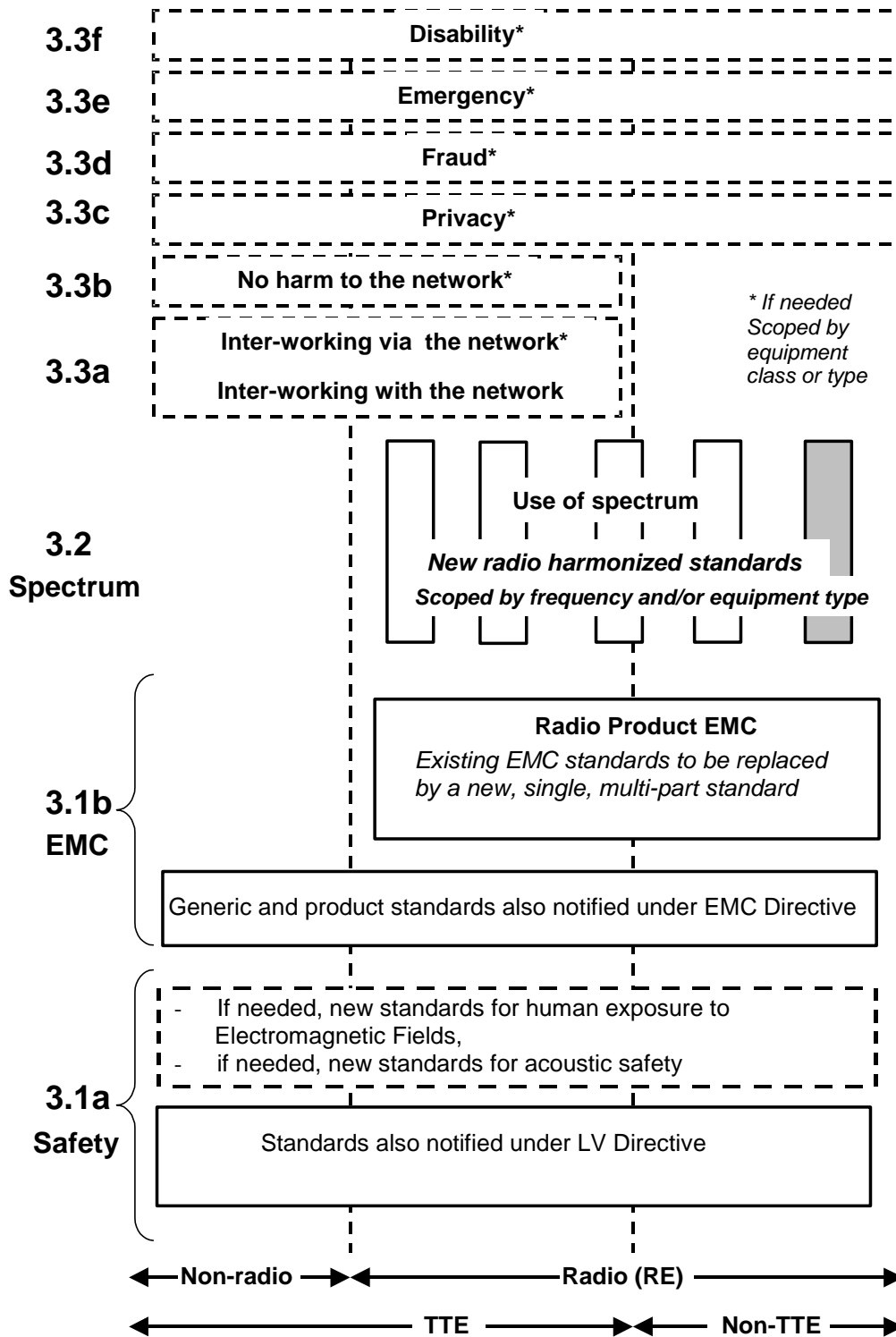


Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive.

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b figure 1 shows EN 301 489 [10], the multi-part product EMC standard for radio, and the existing collection of generic and product standards currently used under the EMC Directive [2].

For article 3.1a figure 1 shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of figure 1 shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions, without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

The product specifications upon which this present multi-part deliverable is based differ in presentation, and this is reflected in the present document.



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# 1 Scope

The present document applies to the following radio equipment types:

- Base stations for IMT-2000 CDMA Multi-Carrier (cdma2000).

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1.

**Table 1: CDMA Multi-Carrier base station service frequency bands**

Direction of transmission	CDMA Multi-Carrier base station service frequency bands
Transmit	2 110 MHz to 2 170 MHz
Receive	1 920 MHz to 1 980 MHz

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) article 3.2, which states that "..... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [1] will apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site <http://www.newapproach.org/>.

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# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [2] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).
- [3] Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).
- [4] ANSI/TIA/EIA-97-D-2001: "Recommended Minimum Performance Standards for Base Stations Supporting Dual Mode Spread Spectrum Systems".
- [5] ANSI/TIA/EIA/IS-2000.2-A-1-2000: "Physical Layer Standard for cdma2000 Spread Spectrum Systems".
- [6] ANSI/TIA/EIA-98-D-2001: "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations".
- [7] ANSI/TIA/EIA126-D-2001: "Loopback Service Options (LSO) for cdma2000 Spread Spectrum Systems".

- [8] ANSI/TIA/EIA/IS-870-April 2001: "Test Data Service Option (TDSO) for cdma2000 Spread Spectrum Systems".
- [9] TIA/EIA/IS-871-April 2001: "Markov Service Option (MSO) for cdma2000 Spread Spectrum Systems".
- [10] ETSI EN 301 489: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1], and the following apply.

**access attempt:** sequence of one or more access probe sequences on the Access Channel or Enhanced Access Channel containing the same message

NOTE 1: See also Access Probe, Access Probe Sequence, and Enhanced Access Probe.

**access channel:** reverse CDMA Channel used by mobile stations for communicating to the base station

NOTE 2: The Access Channel is used for short signalling message exchanges, such as call originations, responses to pages, and registrations. The Access Channel is a slotted random access channel.

**access channel preamble:** preamble of an access probe consisting of a sequence of all-zero frames that is sent at the 4 800 bps rate

**access probe:** one Access Channel transmission consisting of a preamble and a message

NOTE 3: The transmission is an integer number of frames in length, and transmits one Access Channel message. See also Access Probe Sequence and Access Attempt.

**access probe sequence:** sequence of one or more access probes on the Access Channel or Enhanced Access Channel

NOTE 4: The same Access Channel or Enhanced Access Channel message is transmitted in every access probe of an access attempt. See also Access Probe, Enhanced Access Probe, and Access Attempt.

**active frame:** frame that contains data and therefore is enabled in terms of traffic power

**additional preamble:** preamble sent after the last fractional preamble on the Reverse Pilot Channel, prior to transmitting on the Enhanced Access Channel or on the Reverse Common Control Channel

**adjacent channel leakage ratio:** ratio of the on-channel transmit power to the power measured in one of the adjacent channels

**bad frame:** frame classified with insufficient frame quality or for Radio Configuration 19 600 bps primary traffic only, with bit errors

NOTE 5: See also Good Frame.

**band class:** set of frequency channels and a numbering scheme for these channels

NOTE 6: Band classes are defined in ANSI/TIA/EIA-97-D [4], clause 3.1, and ANSI/TIA/EIA-98-D [6], clause 3.1.

**band class 6:** frequencies as identified in table 1 of the EN 301 908-5

**base station:** fixed station used for communicating with mobile stations

NOTE 7: Depending upon the context, the term base station may refer to a cell, a sector within a cell, an MSC, or other part of the wireless system. See also MSC.

**basic access mode:** mode used on the Enhanced Access Channel where a mobile station transmits an Enhanced Access Channel preamble and Enhanced Access data in a method similar to that used on the Access Channel

**broadcast control channel:** code channel in a Forward CDMA Channel used for transmission of control information from a base station to a mobile station

**candidate frequency:** frequency for which the base station specifies a search set, when searching on other frequencies while performing mobile-assisted handoffs

**CDMA channel:** set of channels transmitted from the base station and the mobile stations on a given frequency

**CDMA channel number:** 11-bit number corresponding to the center of the CDMA frequency assignment

**CDMA frequency assignment:** 1,23 MHz segment of spectrum. For Band Class 0, the channel is centered on one of the 30 kHz channels. For Band Classes 1, 4, 6, 7, 8, and 9, the channel is centered on one of the 50 kHz channels. For Band Classes 2 and 3, the channel is centered on one of the 25 kHz channels. For Band Class 5, the channel is centered on one of the 20 kHz or 25 kHz channels.

**CDMA preferred set:** set of CDMA channel numbers in a CDMA system corresponding to frequency assignments that a mobile station will normally search to acquire a CDMA Pilot Channel

**code channel:** subchannel of a Forward CDMA Channel or Reverse CDMA Channel. Each subchannel uses an orthogonal Walsh function or quasi-orthogonal function

**Code Division Multiple Access (CDMA):** technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences

**code symbol:** output of an error-correcting encoder. Information bits are input to the encoder and code symbols are output from the encoder. See Convolutional Code and Turbo Code

**common assignment channel:** forward common channel used by the base station to acknowledge a mobile station accessing the Enhanced Access Channel, and in the case of Reservation Access Mode, to transmit the address of a Reverse Common Control Channel and associated Common Power Control Subchannel

**common power control channel:** forward common channel which transmits power control bits (i.e., common power control subchannels) to multiple mobile stations

NOTE 8: The Common Power Control Channel is used by mobile stations operating in the Power Controlled Access Mode, Reservation Access Mode, or Designated Access Mode.

**common power control subchannel:** subchannel on the Common Power Control Channel used by the base station to control the power of a mobile station when operating in the Power Controlled Access Mode on the Enhanced Access Channel or when operating in the Reservation Access Mode or the Designated Access Mode on the Reverse Common Control Channel

**continuous transmission:** mode of operation in which Discontinuous Transmission is not permitted

**convolutional code:** type of error-correcting code. A code symbol can be considered as the convolution of the input data sequence with the impulse response of a generator function

**cyclic redundancy code:** class of linear error detecting codes which generate parity check bits by finding the remainder of a polynomial division

NOTE 9: See also Frame Quality Indicator.

**discontinuous transmission:** mode of operation in which a base station or a mobile station switches its transmitter or a particular code channel on and off autonomously

NOTE 10: For the case of DTX operation on the Forward Dedicated Control Channel, the Forward Power Control Subchannel is still transmitted.

**effective radiated power:** product of the power supplied to the antenna and the antenna gain in a direction relative to a half-wave dipole

**enhanced access channel:** reverse channel used by the mobile for communicating to the base station

NOTE 11: The Enhanced Access Channel operates in the Basic Access Mode, Power Controlled Access Mode, and Reservation Access Mode. It is used for transmission of short messages, such as signalling, MAC messages, response to pages, and call originations. It can also be used to transmit moderate-sized data packets.

**enhanced access channel preamble:** non-data-bearing portion of the Enhanced Access probe sent by the mobile station to assist the base station in initial acquisition and channel estimation

**enhanced access data:** data transmitted while in the Basic Access Mode or Power Controlled Access Mode on the Enhanced Access Channel or while in the Reservation Mode on a Reverse Common Control Channel

**enhanced access header:** frame containing access origination information transmitted immediately after the Enhanced Access Channel preamble while in the Power Controlled Access Mode or Reservation Access Mode

**enhanced access probe:** one Enhanced Access Channel transmission consisting of an Enhanced Access Channel preamble, optionally an Enhanced Access header, and optionally Enhanced Access data

**enhanced access probe sequence:** sequence of one or more Enhanced Access probes on the Enhanced Access Channel. See also Enhanced Access Probe

**environmental profile:** range of environmental conditions under which equipment within the scope of the present document is required to comply with the provisions of the present document

**forward CDMA channel:** CDMA Channel from a base station to mobile stations

NOTE 12: The Forward CDMA Channel contains one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset.

**forward common control channel:** control channel used for the transmission of digital control information from a base station to one or more mobile stations

**forward dedicated control channel:** portion of a Radio Configuration 3 through 9 Forward Traffic Channel used for the transmission of higher-level data, control information, and power control information from a base station to a mobile station

**forward fundamental channel:** portion of a Forward Traffic Channel which carries a combination of higher-level data and power control information

**forward pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by each CDMA base station

NOTE 13: The Pilot Channel allows a mobile station to acquire the timing of the Forward CDMA Channel, provides a phase reference for coherent demodulation, and provides means for signal strength comparisons between base stations for determining when to handoff.

**forward power control subchannel:** subchannel on the Forward Fundamental Channel or Forward Dedicated Control Channel used by the base station to control the power of a mobile station when operating on the Reverse Traffic Channel

**forward supplemental channel:** portion of a Radio Configuration 3 through 9 Forward Traffic Channel which operates in conjunction with a Forward Fundamental Channel or a Forward Dedicated Control Channel in that Forward Traffic Channel to provide higher data rate services, and on which higher-level data is transmitted

**forward supplemental code channel:** portion of a Radio Configuration 1 and 2 Forward Traffic Channel which operates in conjunction with a Forward Fundamental Channel in that Forward Traffic Channel to provide higher data rate services, and on which higher-level data is transmitted

**forward traffic channel:** one or more code channels used to transport user and signalling traffic from the base station to the mobile station

NOTE 14: See Forward Fundamental Channel, Forward Dedicated Control Channel, Forward Supplemental Channel, and Forward Supplemental Code Channel.

**frame:** basic timing interval in the system

NOTE 15: For the Sync Channel, a frame is 26,666... ms long. For the Access Channel, the Paging Channel, the Broadcast Channel, the Forward Supplemental Code Channel, and the Reverse Supplemental Code Channel, a frame is 20 ms long. For the Forward Supplemental Channel and the Reverse Supplemental Channel, a frame is 20 ms, 40 ms, or 80 ms long. For the Enhanced Access Channel, the Forward Common Control Channel, and the Reverse Common Control Channel, a frame is 5 ms, 10 ms, or 20 ms long. For the Forward Fundamental Channel, Forward Dedicated Control Channel, Reverse Fundamental Channel, and Reverse Dedicated Control Channel, a frame is 5 ms or 20 ms long. For the Common Assignment Channel, a frame is 5 ms long.

**frame activity:** ratio of the number of active frames to the total number of frames during channel operation

**frame error rate:** Frame Error Rate of Forward Traffic Channel. The value of Frame Error Rate may be estimated by using Service Option 2, 9, 32, 54, or 55 (see TIA/EIA-97-D, clause 1.3)

**frame quality indicator:** CRC check applied to 9,6 and 4,8 kbps Traffic Channel frames of Radio Configuration 1, to all Forward Traffic Channel frames for Radio Configurations 2 through 9, to all Reverse Traffic Channel frames for Radio Configurations 2 through 6, the Broadcast Channel, Common Assignment Channel, Enhanced Access Channel, and to the Reverse Common Control Channel.

**good frame:** frame not classified as a bad frame. See also Bad Frame

**good message:** received message is declared a good message if it is received with a correct CRC

**handoff:** act of transferring communication with a mobile station from one base station to another

**hard handoff:** Handoff characterized by a temporary disconnection of the Traffic Channel. Hard handoffs occur when the mobile station is transferred between disjoint Active Sets, the CDMA frequency assignment changes, the frame offset changes, or the mobile station is directed from a CDMA Traffic Channel to an analog voice channel. See also Soft Handoff.

**mean input power:** total received calorimetric power measured in a specified bandwidth at the antenna connector, including all internal and external signal and noise sources

**mean output power:** total transmitted calorimetric power measured in a specified bandwidth at the antenna connector when the transmitter is active

**mobile station:** station intended to be used while in motion or during halts at unspecified points

NOTE 16: Mobile stations include portable units (e.g., hand-held personal units) and units installed in vehicles.

**mobile station class:** mobile station classes define mobile station characteristics, such as slotted operation and transmission power

**mobile switching center:** configuration of fixed equipment that provides cellular or PCS service

**non-slotted mode:** operation mode of the mobile station in which the mobile station continuously monitors the Paging Channel

**orthogonal channel noise simulator:** hardware mechanism used to simulate the users on the other orthogonal channels of a Forward CDMA Channel

**orthogonal transmit diversity:** forward link transmission method which distributes forward link channel symbols among multiple antennas and spreads the symbols with a unique Walsh or quasi-orthogonal function associated with each antenna

**paging channel:** code channel in a Forward CDMA Channel used for transmission of control information and pages from a base station to a mobile station

**physical layer:** part of the communication protocol between the mobile station and the base station that is responsible for the transmission and reception of data

NOTE 17: The physical layer in the transmitting station is presented a frame and transforms it into an over-the-air waveform. The physical layer in the receiving station transforms the waveform back into a frame.

**piece-wise linear FER curve:** FER-versus-Eb/Nt curve in which the FER vertical axis is in log scale and the Eb/Nt horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines

**piece-wise linear MER curve:** MER-versus- $E_b/N_t$  curve in which the MER vertical axis is in log scale and the  $E_b/N_t$  horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines

**pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted by a CDMA base station or mobile station

NOTE 18: A pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength comparisons between base stations for determining when to handoff.

**pilot PN sequence:** pair of modified maximal length PN sequences used to spread the Forward CDMA Channel and the Reverse CDMA Channel

NOTE 19: Different base stations are identified by different pilot PN sequence offsets.

**PN chip:** one bit in the PN sequence

**PN sequence (Pseudonoise sequence):** periodic binary sequence

**power control bit:** bit, sent in every 1,25 ms interval on the Forward Traffic Channel, to signal the mobile station to increase or decrease its transmit power

**power control group:** 1,25 ms interval on the Forward Traffic Channel and the Reverse Traffic Channel (see also Power Control Bit).

**power controlled access mode:** mode used on the Enhanced Access Channel where a mobile station transmits an Enhanced Access preamble, an Enhanced Access header, and Enhanced Access data in the Enhanced Access probe using closed loop power control

**power up function:** method by which the mobile station increases its output power to support location services

**preamble:** see Access Channel preamble, Enhanced Access Channel preamble, Reverse Common Control Channel preamble, and Reverse Traffic Channel Preamble

**primary paging channel:** default code channel (code channel 1) assigned for paging on a CDMA Channel

**PUF probe:** one or more consecutive frames on the Reverse Traffic Channel within which the mobile station transmits the PUF pulse

**PUF pulse:** portion of PUF probe which may be transmitted at elevated output power

**PUF target frequency:** CDMA frequency to which the base station directs a mobile station for transmitting the PUF probe

**quick paging channel:** uncoded, spread, and On-Off-Keying (OOK) modulated spread spectrum signal sent by a base station to inform mobile stations operating in the slotted mode during the idle state whether to receive the Forward Common Control Channel or the Paging Channel starting in the next Forward Common Control Channel or Paging Channel frame

**radio configuration:** set of Forward Traffic Channel and Reverse Traffic Channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics, and spreading rate. Radio Configurations are defined in TIA/EIA/IS-2000.2-A-1, clauses 2.1.3 and 3.1.3.

**Received Signal Quality Indicator:** Reverse Traffic Channel measure of signal quality related to the received  $E_b/N_0$  (see also  $E_b$ )

**Reservation Access Mode:** mode used on the Enhanced Access Channel and Reverse Common Control Channel where a mobile station transmits an Enhanced Access preamble and an Enhanced Access header in the Enhanced Access probe

NOTE 20: The Enhanced Access data is transmitted on a Reverse Common Control Channel using closed loop power control.

**reverse CDMA channel:** CDMA Channel from the mobile station to the base station

NOTE 21: From the base station's perspective, the Reverse CDMA Channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

**reverse common control channel:** portion of a Reverse CDMA Channel used for the transmission of digital control information from one or more mobile stations to a base station

NOTE 22: The Reverse Common Control Channel can operate in a Reservation Access Mode or Designated Access Mode. It can be power controlled in the Reservation Access Mode or Designated Access Mode, and may support soft handoff in the Reservation Access Mode.

**reverse common control channel preamble:** non-data bearing portion of the Reverse Common Control Channel sent by the mobile station to assist the base station in initial acquisition and channel estimation

**reverse dedicated control channel:** portion of a Radio Configuration 3 through 6 Reverse Traffic Channel used for the transmission of higher-level data and control information from a mobile station to a base station

**reverse fundamental channel:** portion of a Reverse Traffic Channel which carries higher-level data and control information from a mobile station to a base station

**reverse pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA mobile station

NOTE 23: A reverse pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength measurement.

**reverse power control subchannel:** subchannel on the Reverse Pilot Channel used by the mobile station to control the power of a base station when operating on the Forward Traffic Channel with Radio Configurations 3 through 9

**reverse supplemental channel:** portion of a Radio Configuration 3 through 6 Reverse Traffic Channel which operates in conjunction with the Reverse Fundamental Channel or the Reverse Dedicated Control Channel in that Reverse Traffic Channel to provide higher data rate services, and on which higher-level data is transmitted

**reverse supplemental code channel:** portion of a Radio Configuration 1 and 2 Reverse Traffic Channel which operates in conjunction with the Reverse Fundamental Channel in that Reverse Traffic Channel, and (optionally) with other Reverse Supplemental Code Channels to provide higher data rate services, and on which higher-level data is transmitted

**reverse traffic channel:** traffic channel on which data and signalling are transmitted from a mobile station to a base station

NOTE 24: The Reverse Traffic Channel is composed of up to one Reverse Dedicated Control Channel, up to one Reverse Fundamental Channel, zero to two Reverse Supplemental Channels, and zero to seven Reverse Supplemental Code Channels.

**reverse traffic channel preamble:** non-data bearing portion of the Reverse Pilot Channel sent by the mobile station to aid the base station in initial acquisition and channel estimation for the Reverse Dedicated Control Channel and Reverse Fundamental Channel

**RF carrier:** direct-sequence spread RF channel

NOTE 25: For the Forward CDMA Channel, the number of RF carriers is equal to the Spreading Rate; for the Reverse CDMA Channel, there is one RF carrier.

**service option 2:** loopback service option for Radio Configuration 1 as specified in TIA/EIA-126-D

**service option 9:** loopback service option for Radio Configuration 2 as specified in TIA/EIA-126-D

**service option 30:** mobile station data loopback test mode for Multiplex Option 1 Supplemental Channel as specified in TIA/EIA-126-D

**service option 31:** mobile station data loopback test mode for Multiplex Option 2 Supplemental Channel as specified in TIA/EIA-126-D

**service option 32:** test data service option for Radio Configurations 3 through 6 on the Reverse Traffic Channel and Radio Configurations 3 through 9 on the Forward Traffic Channel as specified in TIA/EIA/IS-870

**service option 54:** markov service option for Radio Configurations 1 through 6 on the Reverse Traffic Channel and Radio Configurations 1 through 9 on the Forward Traffic Channel as specified in TIA/EIA/IS-871

**service option 55:** loopback service option for Radio Configurations 1 through 6 on the Reverse Traffic Channel and Radio Configurations 1 through 9 on the Forward Traffic Channel as specified in TIA/EIA-126-D

**servicing frequency:** CDMA frequency on which a mobile station is currently communicating with one or more base stations

**slotted mode:** operation mode of the mobile station in which the mobile station monitors only selected slots on the Paging Channel

**soft handoff:** handoff occurring while the mobile station is in the Mobile Station Control on the Traffic Channel State

NOTE 26: This handoff is characterized by commencing communications with a new base station on the same CDMA frequency assignment before terminating communications with the old base station. See Hard Handoff.

**space time spreading:** forward link transmission method which transmits all forward link channel symbols on multiple antennas and spreads the symbols with complementary Walsh or quasi-orthogonal functions

**spreading rate:** PN chip rate of the Forward CDMA Channel or the Reverse CDMA Channel, defined as a multiple of 1,2288 Mcps

**spreading rate 1:** Spreading Rate 1 is often referred to as "1X". A Spreading Rate 1 Forward CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps. A Spreading Rate 1 Reverse CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.

**spreading rate 3:** Spreading Rate 3 is often referred to as "3X". A Spreading Rate 3 Forward CDMA Channel uses three direct-sequence spread carriers (see Multiple-Carrier Forward Channel) each with a chip rate of 1,2288 Mcps. A Spreading Rate 3 Reverse CDMA Channel uses a single direct-sequence spread carrier with a chip rate of 3,6864 Mcps.

**symbol:** see Code Symbol and Modulation Symbol

**sync channel:** code channel 32 in the Forward CDMA Channel, which transports the synchronization message to the mobile station

**system time:** Time reference used by the system. System Time is synchronous to UTC time (except for leap seconds) and uses the same time origin as Global Positioning System (GPS) time. All base stations use the same System Time (within a small error). Mobile stations use the same System Time, offset by the propagation delay from the base station to the mobile station. See also Universal Coordinated Time.

**time reference:** reference established by the mobile station that is synchronous with the earliest arriving multipath component used for demodulation

**traffic channel:** communication path between a mobile station and a base station used for user and signalling traffic

NOTE 27: The term Traffic Channel implies a Forward Traffic Channel and Reverse Traffic Channel pair. See also Forward Traffic Channel and Reverse Traffic Channel.

**transmit diversity pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA base station to support forward link transmit diversity

NOTE 28: The pilot channel and the transmit diversity pilot channel provide phase references for coherent demodulation of forward link CDMA channels which employ transmit diversity.

**turbo code:** Type of error-correcting code. A code symbol is based on the outputs of the two recursive convolutional codes (constituent codes) of the Turbo code.

**universal coordinated time:** Internationally agreed-upon time scale maintained by the Bureau International de l'Heure (BIH) used as the time reference by nearly all commonly available time and frequency distribution systems, e.g. WWV, WWVH, LORAN-C, Transit, Omega, and GPS.

**valid power control bit:** valid power control bit is sent on the Forward Traffic Channel in the second power control group following the corresponding Reverse Traffic Channel power control group which was not gated off and in which the signal was estimated (see TIA/EIA/IS-2000.2-A-1, clause 3.1.3.1.10)

**walsh function:** one of  $2^N$  time orthogonal binary functions (note that the functions are orthogonal after mapping '0' to 1 and '1' to -1)



## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

bit/s	Bits per second
$\frac{\text{BCCH } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN energy-per-PNchip for the Broadcast Control Channel to the total transmit power spectral density
dBc	The ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the center frequency of the same signal, to the total inband power of the signal. For CDMA, the total inband power of the signal is measured in a 1,23 MHz bandwidth around the center frequency of the CDMA signal.
dBm	A measure of power expressed in terms of its ratio (in dB) to 1 mW
dBm/Hz	A measure of power spectral density. The ratio, dBm/Hz, is the power in 1Hz of bandwidth, where power is expressed in units of dBm
$E_b$	Energy per information bit at the base station RF input port or the mobile station antenna connector. For Radio Configurations 1 and 2, this is the energy for the Access Channel or Traffic Channel. For the Reverse Enhanced Access Channel with Radio Configurations 3 through 6, this is the energy for the Reverse Enhanced Access Channel and the Reverse Pilot Channel. For the Reverse Common Control Channel with Radio Configurations 3 through 6, this is the energy for the Reverse Common Control Channel and the Reverse Pilot Channel. For the Reverse Traffic Channel with Radio Configurations 3 through 6, this is the energy for the Reverse Traffic Channel, the Reverse Pilot Channel, and the Reverse Power Control Subchannel.
$E_b/N_t$	The ratio in dB of the combined received energy per bit to the effective noise power spectral density
$E_c$	Average energy accumulated over one PN chip period
$E_c/I_{or}$	The ratio in dB between the energy accumulated over one PN chip period ( $E_c$ ) to the total transmit power spectral density
$E_c/I_o$	The ratio in dB between the pilot energy accumulated over one PN chip period ( $E_c$ ) to the total power spectral density ( $I_o$ ) in the received bandwidth
$\frac{\text{FCACH } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Forward Common Assignment Channel to the total transmit power spectral density
$\frac{\text{FCCCH } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Forward Common Control Channel to the total transmit power spectral density.
$\frac{\text{FCPCCH } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Forward Common Power Control Channel to the total transmit power spectral density
GHz	GigaHertz ( $10^9$ Hertz)
$I_o$	The total received power spectral density, including signal and interference, as measured at the mobile or base station antenna connector
$I_{oc}$	The power spectral density of a band-limited white noise source (simulating interference from other cells) as measured at the mobile station antenna connector
$I_{or}$	The total transmit power spectral density of the Forward CDMA Channel at the base station antenna connector
$\hat{I}_{or}$	The received power spectral density of the Forward CDMA Channel as measured at the mobile station antenna connector
kHz	kiloHertz ( $10^3$ Hertz)
mbar	millibar ( $10^{-3}$ Bar)
MHz	MegaHertz ( $10^6$ Hertz)
Mcps	Megachips per second ( $10^6$ chips per second).
$\mu$ s	microsecond ( $10^{-6}$ second)
ms	millisecond ( $10^{-3}$ second)

ns	nanosecond ( $10^{-9}$ second)
$N_0$	The effective inband noise or interference power spectral density
OCNS $E_c$	Average energy-per-PN chip for the OCNS
$\frac{\text{OCNS } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the OCNS to the total transmit power spectral density
Pa	Pascal
Paging $E_c$	Average energy-per-PN chip for the Paging Channel
$\frac{\text{Paging } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Paging Channel to the total transmit power spectral density
Pilot $E_c$	Average energy-per-PN chip for the Pilot Channel
Pilot $\frac{E_c}{I_o}$	The ratio of the combined pilot energy per chip, $E_c$ , to the total received power spectral density (noise and signals), $I_o$ , of at most K usable multipath components at the mobile station antenna connector. K is the number of demodulating elements supported by the mobile station.
$\frac{\text{Pilot } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Pilot Channel to the total transmit power spectral density
Power Control $E_c$	Average energy-per-PN chip for the power control subchannel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9 600 bps or 14 400 bps data rate, the following equations apply: For Radio Configuration 1, it is equal to $\frac{v}{11+v} \times$ (total Forward Traffic Channel energy-per-PN chip), where v equals 1 for 9 600 bps, v equals 2 for 4 800 bps, v equals 4 for 2 400 bps, and v equals 8 for 1 200 bps traffic data rate. For Radio Configuration 2, it is equal to $\frac{v}{23+v}$ (total Forward Traffic Channel energy-per-PN chip), where v equals 1 for 14 400 bps, v equals 2 for 7200 bps, v equals 4 for 3600 bps, and v equals 8 for 1800 bps traffic data rate. For Radio Configurations 3, 4, 6, and 7, it is equal to $\frac{v}{11+v}$ (total Forward Traffic Channel energy-per-PN chip), where v equals 1 for 9 600 bps, v equals 2 for 4 800 bps, v equals 4 for 2700 bps, and v equals 8 for 1 500 bps traffic data rate. For Radio Configurations 5, 8, and 9, it is equal to $\frac{v}{11+v}$ (total Forward Traffic Channel energy-per-PN chip), where v equals 1 for 14 400 bps, v equals 2 for 7 200 bps, v equals 4 for 3 600 bps, and v equals 8 for 1 800 bps traffic data rate. The total Forward Traffic Channel is comprised of traffic data and a power control sub-channel.
$\frac{\text{Power Control } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the power control subchannel to the total transmit power spectral density
$\frac{\text{Quick Paging } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Quick Paging Channel to the total transmit power spectral density
Supplemental $E_c$	Average energy-per-PN chip for one Forward Supplemental Code Channel
Supplemental $\frac{E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for one Forward Supplemental to the total transmit power spectral density
Sync $E_c$	Average energy-per-PN chip for the Sync Channel
$\frac{\text{Sync } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Sync Channel to the total transmit power spectral density

Traffic $E_c$	<p>Average energy-per-PN chip for the Forward Fundamental Channel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9 600 bps or 14 400 bps data rate, the following equations apply:</p> <p>For Radio Configuration 1, it is equal to <math>\frac{11}{11+v}</math> (total Forward Fundamental Channel energy-per-PN chip), where <math>v</math> equals 1 for 9 600 bps, <math>v</math> equals 2 for 4 800 bps, <math>v</math> equals 4 for 2 400 bps, and <math>v</math> equals 8 for 1 200 bps traffic data rate. For Radio Configuration 2, it is equal to <math>\frac{23}{23+v}</math> (total Forward Fundamental Channel energy-per-PN chip), where <math>v</math> equals 1 for 14 400 bps, <math>v</math> equals 2 for 7200 bps, <math>v</math> equals 4 for 3600 bps, and <math>v</math> equals 8 for 1800 bps traffic data rate. The total Forward Fundamental Channel is comprised of traffic data and a power control sub-channel. For Radio Configurations 3, 4, 6, and 7, it is equal to <math>\frac{11}{11+v}</math> (total Forward Traffic Channel energy-per-PN chip), where <math>v</math> equals 1 for 9 600 bps, <math>v</math> equals 2 for 4 800 bps, <math>v</math> equals 4 for 2 700 bps, and <math>v</math> equals 8 for 1 500 bps traffic data rate. For Radio Configurations 5, 8, and 9, it is equal to <math>\frac{11}{11+v}</math> (total Forward Traffic Channel energy-per-PN chip), where <math>v</math> equals 1 for 14 400 bps, <math>v</math> equals 2 for 7 200 bps, <math>v</math> equals 4 for 3 600 bps, and <math>v</math> equals 8 for 1800 bps traffic data rate. The total Forward Traffic Channel is comprised of traffic data and a power control sub-channel.</p>
$\frac{\text{Traffic } E_c}{I_{or}}$	The ratio of the average transmit energy-per-PN chip for the Forward Traffic Channel to
ppm	the total transmit power spectral density Parts per million

### 3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACLR	Adjacent Channel Leakage Ratio
BS	Base Station
CDMA	Code Division Multiple Access
CRC	Cyclic Redundancy Code
DTX	Discontinuous Transmission
EMC	Electro-Magnetic Compatibility
FER	Frame Error Rate
HPSK	Hybrid Phase Shift Keying
LV	Low Voltage
MER	Message Error Rate, $MER = 1 - \frac{\text{Number of good messages received}}{\text{Number of messages transmitted}}$
MSC	Mobile Switching Center
OCNS	Orthogonal Channel Noise Simulator
PN	PseudoNoise
PUF	Power Up Function
R&TTE	Radio and Telecommunications Terminal Equipment
UE	User Equipment
UTC	Universal Temps Coordoné (See Universal Coordinated Time)

## 4 Technical requirements specifications

### 4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be declared by the supplier. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the declared operational environmental profile.

For guidance on how a supplier can declare the environmental profile see annex B of the present document.

### 4.2 Conformance requirements

#### 4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [1] for IMT-2000 base stations (BS) seven (7) essential parameters have been identified. Table 2 provides a cross-reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

To fulfil an essential parameter the compliance with all the corresponding technical requirements in table 2 must be verified.

**Table 2: Cross references**

<b>Essential parameter</b>	<b>Corresponding technical requirements</b>
Spectrum emissions mask	4.2.2 Transmitter conducted spurious emissions
Conducted spurious emissions from the transmitter antenna connector	4.2.2 Transmitter conducted spurious emissions
Accuracy of maximum output power	4.2.3 Maximum output power
Intermodulation attenuation of the transmitter	4.2.4 Inter-base station transmitter intermodulation
Conducted spurious emissions from the receiver antenna connector	4.2.5 Receiver conducted spurious emissions
Impact of interference on receiver performance	4.2.6 Receiver blocking characteristics
	4.2.7 Intermodulation spurious response attenuation
Receiver adjacent channel selectivity	4.2.8 Adjacent channel selectivity

#### 4.2.2 Transmitter conducted spurious emissions

##### 4.2.2.1 Definition

Conducted spurious emissions are emissions at frequencies that are outside the assigned CDMA Channel, measured at the base station RF output port.

##### 4.2.2.2 Limits

The spurious emissions shall be less than the limits specified in table 3 and table 4. The spurious emissions limits in table 3 and table 4 shall be met when transmitting on a single or all RF carriers supported by the base station and configured in accordance with the manufacturer's specification as indicated by the entries in the column 'Active Carriers'.

**Table 3: Transmitter spurious emission limits**

For $ \Delta f $ Within the Range	Active Carriers	Emission Limit
885 kHz to 1,25 MHz	Single	-45 dBc / 30 kHz
1,25 MHz to 1,45 MHz	All	-13 dBm / 30 kHz
1,45 MHz to 2,25 MHz	All	$-[13 + 17 \times (\Delta f - 1,45 \text{ MHz})]$ dBm / 30 kHz
2,25 MHz to 4,00 MHz	All	-13 dBm / 1 MHz
> 4,00 MHz	All	-36 dBm/1 kHz; 9 kHz < f < 150 kHz -36 dBm/10 kHz; 150 kHz < f < 30 MHz -36 dBm/100 kHz; 30 MHz < f < 1 GHz -30 dBm/1 MHz; 1 GHz < f < 12,75 GHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = center frequency - closer edge frequency (f) of the measurement filter. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the center frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the center frequency of the lowest carrier - closer measurement edge frequency (f).		

**Table 4: Additional transmitter spurious emission limits**

Measurement Frequency	Active Carriers	Emission Limit	For Protection Of
921 MHz to 960 MHz	All	-57 dBm / 100 kHz	GSM 900 MS Receive Frequency Range
1805 MHz to 1880 MHz	All	-47 dBm / 100 kHz	DCS 1800 MS Receive Frequency Range
1900 MHz to 1920 MHz 2010 MHz to 2025 MHz	All	-52 dBm / 1 MHz	IMT-2000 CDMA TDD
1920 MHz to 1980 MHz	Single	-86dBm / 1 MHz	IMT-2000 CDMA Multi-Carrier and IMT-2000 CDMA Direct Spread BS Receive Frequency Range

#### 4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

### 4.2.3 Maximum output power

#### 4.2.3.1 Definition

Maximum output power is the mean power delivered to a load with resistance equal to the nominal load impedance of the transmitter.

#### 4.2.3.2 Limits

The maximum output power shall remain within +2 dB and -4 dB of the manufacturer's rated power for the equipment.

#### 4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

### 4.2.4 Inter-base station transmitter intermodulation

#### 4.2.4.1 Definition

Inter-base station transmitter intermodulation occurs when an external signal source is introduced to the antenna connector of the base station. This test verifies that transmitter conducted spurious emissions are still met with the presence of the interfering source.

#### 4.2.4.2 Limits

The base station shall meet the limits for transmitter conducted spurious emission requirements in clause 4.2.2.2 of the present document.

#### 4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

### 4.2.5 Receiver conducted spurious emissions

#### 4.2.5.1 Definition

Conducted spurious emissions are spurious emissions generated or amplified in the base station equipment and appearing at the receiver RF input ports.

This requirement only applies if the base station is equipped with a separate RF input port.

#### 4.2.5.2 Limits

The conducted spurious emissions shall be:

- 1) Less than -80 dBm, measured in a 30 kHz resolution bandwidth at the base station RF input ports, for frequencies within the base station receiver band (see table 1).
- 2) Less than -60 dBm, measured in a 30 kHz resolution bandwidth at the base station RF input ports, for frequencies within the base station transmit band (see table 1).
- 3) Less than -57 dBm, measured in a 100 kHz resolution bandwidth at the base station RF input ports, for frequencies from 30 MHz to 1 GHz.
- 4) Less than -47 dBm, measured in a 1 MHz resolution bandwidth at the mobile station antenna connector, for all other frequencies in the range from 1 GHz to 12,75 GHz with the exception of frequencies used by the BS between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency when the BS is operating in Spreading Rate 1 mode, and 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency when the BS is operating in Spreading Rate 3 mode.

#### 4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

### 4.2.6 Receiver blocking characteristics

#### 4.2.6.1 Definition

The receiver blocking characteristic is a measure of the receiver's ability to receive a CDMA signal at its assigned channel frequency in the presence of a single tone on frequencies other than those of the adjacent channels, without this unwanted input signal causing a degradation of the performance of the receiver beyond a specified limit.

#### 4.2.6.2 Limits

In the presence of an interfering CW tone as described in the test method in clause 5.3.5, the increase in mobile station output power (relative to the initial mobile station output power level) shall be less than 3 dB.

#### 4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

## 4.2.7 Intermodulation spurious response attenuation

### 4.2.7.1 Definition

The intermodulation spurious response attenuation is a measure of a receiver's ability to receive a CDMA signal on its assigned channel frequency in the presence of two interfering CW tones. These tones are separated from the assigned channel frequency and are separated from each other such that the third order mixing of the two interfering CW tones can occur in the non-linear elements of the receiver, producing an interfering signal in the band of the desired CDMA signal.

### 4.2.7.2 Limits

The output power of the mobile station simulator shall increase by no more than 3 dB and the FER shall be less than 1,5 % with 95 % confidence (see TIA/EIA-97-D [4], clause 6.8).

### 4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

## 4.2.8 Adjacent channel selectivity

### 4.2.8.1 Definition

Adjacent channel selectivity is a measure of the ability to receive a CDMA signal on the assigned channel frequency in the presence of another CDMA signal that is offset from the center frequency of the assigned channel by  $\pm 2,5$  MHz for Spreading Rate 1 or  $\pm 5$  MHz for Spreading Rate 3.

### 4.2.8.2 Limits

The output power of the mobile station simulator shall increase by no more than 3 dB and the FER shall be less than 1,5 % with 95 % confidence (see TIA/EIA-97-D [4], clause 6.8).

### 4.2.8.3 Conformance

Conformance tests described in clause 5.3.7 shall be carried out.

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# 5 Testing for compliance with technical requirements

## 5.1 Conditions for testing

### 5.1.1 Introduction

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

Normally it should be sufficient for all tests to be conducted using standard test conditions except where otherwise stated (see TIA/EIA-98-D [4]). For a definition of standard test conditions and for guidance on the use of other test conditions to be used in order to show compliance reference can be made to annex B.

## 5.1.2 Standard equipment under test

### 5.1.2.1 Basic equipment

The equipment under test shall be assembled and any necessary adjustments shall be made in accordance with the manufacturer's instructions for the mode of operation required. When alternative modes are available, the equipment shall be assembled and adjusted in accordance with the relevant instructions. A complete series of measurements shall be made for each mode of operation.

### 5.1.2.2 Ancillary equipment

The base station equipment may include ancillary equipment during tests if the ancillary equipment is normally used in the operation of the equipment under test. This would include power supplies, cabinets, antenna couplers, and receiver multi-couplers.

## 5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty or the accuracy of each piece of test equipment used for the measurement of each parameter shall be included in the test report; only test equipment meeting the performance requirements for standard test equipment as defined in TIA/EIA-97-D [4], clause 6.4, shall be used; the test set-up of each test shall be equivalent to the test set-up descriptions in TIA/EIA-97-D [4], clause 6.5;
- the recorded value of the measurement uncertainty or the recorded value of the accuracy of each piece of test equipment shall be equal to or better than the figures in TIA/EIA-97-D [4], clause 6.4.

## 5.3 Essential radio test suites

### 5.3.1 Transmitter conducted spurious emissions

- 1) Connect a spectrum analyser (or other suitable test equipment) to each base station RF output port, using an attenuator or directional coupler if necessary.
- 2) Configure the base station to operate in band class 6 and perform steps 3 through 11.
- 3) Configure the base station to transmit a single carrier and perform steps 4 through 6.
- 4) Set the base station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and Traffic Channels as stated in TIA/EIA-97-D [4], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer.
- 5) Measure the power level at the carrier frequency.
- 6) Measure the spurious emission levels.
- 7) If the base station supports two carriers through a single RF output port with a carrier-to-carrier spacing of 1,25 MHz, configure the base station to transmit two adjacent carriers and perform steps 10 and 11.
- 8) If the base station supports two carriers through a single RF output port with a carrier-to-carrier spacing of greater than 1,25 MHz, configure the base station to transmit two non-adjacent carriers and perform steps 10 and 11.
- 9) If the base station supports three or more carriers through a single RF output port, configure the base station to transmit all carriers with the smallest carrier-to-carrier spacing specified by the manufacturer and perform steps 10 and 11.



10) Set the base station to transmit multiple signals modulated with a combination of Pilot, Sync, Paging, and Traffic Channels as stated in TIA/EIA-97-D [4], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer for the multiple-carrier configuration under test.

11) Measure the spurious emission levels.

The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance.

### 5.3.2 Maximum output power

Test environment: normal and extreme (for guidance see annex B).

- 1) Connect the power measuring equipment to the base station RF output port.
- 2) Configure the base station to operate in band class 6 and perform steps 3 and 4.
- 3) Set the base station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and Traffic Channels as stated in TIA/EIA-97-D [4], clause 6.5.2.
- 4) Measure the mean power at the RF output port.

The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance.

### 5.3.3 Inter-base station transmitter intermodulation

- 1) Connect a spectrum analyser (or other suitable test equipment) and the external base station to the base station RF output port, using attenuators or directional couplers if necessary as shown in TIA/EIA-97-D [4], figure 6.5.1-9.
- 2) Configure the base station to operate in band class 6 and perform steps 3 through 6.
- 3) Set the base station under test to transmit a signal modulated with a combination of Pilot, Sync, Paging, and Traffic Channels as stated in TIA/EIA-97-D [4], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer.
- 4) Set the second base station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and Traffic Channels as stated in TIA/EIA-97-D [4], clause 6.5.2 with a total power that is 30 dB less than the power of the other base station with an offset of 1,25 MHz between the center of the CDMA center frequencies for Spreading Rate 1 or 3,75 MHz between the center of the CDMA center frequencies for Spreading Rate 3.
- 5) Measure the power level at the carrier frequency.
- 6) Measure the spurious emission level at the image of the base station transmitter and the interference source. The image is centered at a frequency of 2 times the center frequency of the base station under test minus the center frequency of the second base station. The bandwidth of the image is the same as the bandwidth of the Radio Configuration in effect.

The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

### 5.3.4 Receiver conducted spurious emissions

- 1) Connect a spectrum analyser (or other suitable test equipment) to a receiver RF input port.
- 2) Configure the base station to operate in band class 6 and perform steps 3 through 5.
- 3) Disable all transmitter RF outputs.
- 4) Perform step 5 for all receiver input ports.
- 5) Sweep the spectrum analyser over a frequency range from 30 MHz to 12,75 GHz and measure the spurious emission level.

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance.

### 5.3.5 Receiver blocking characteristics

- 1) Configure the base station under test and a mobile station simulator as shown in TIA/EIA-97-D [4], figure 6.5.1-3.
- 2) Configure the base station to operate in band class 6 and perform steps 3 through 14.
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) If the base station supports demodulation of Radio Configuration 1 or 2, set up a call using Fundamental Channel Test Mode 1 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 13.
- 5) If the base station supports demodulation of Radio Configuration 3 or 4, set up a call using Fundamental Channel Test Mode 3 or Dedicated Control Channel Test Mode 3 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 13.
- 6) If the base station supports demodulation of Radio Configuration 5 or 6, set up a call using Fundamental Channel Test Mode 7 or Dedicated Control Channel Test Mode 7 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 13.
- 7) Transmit random data to the mobile station simulator at full data rate.
- 8) Measure the mobile station simulator output power.
- 9) Adjust the CW generator power to be 75 dB above the mobile station simulator output power at the RF input ports as measured in step 8.
- 10) If the base station is operating with Spreading Rate 1 step the CW Tone frequency from 1 900 MHz to 2 000 MHz at 1 MHz intervals but skip frequencies closer than 5 MHz to the carrier frequency and perform step 14.
- 11) If the base station is operating with Spreading Rate 3 step the CW Tone frequency from 1 900 MHz to 2 000 MHz at 1 MHz intervals but skip frequencies closer than 10 MHz to the carrier frequency and perform step 14.
- 12) Adjust the CW generator power to be 100 dB above the mobile station simulator output power at the RF input ports as measured in step 8.
- 13) Step the CW Tone frequency from 1 MHz to 1 899 MHz and 2 001 MHz to 12 750 MHz in 1 MHz steps and perform step 14.
- 14) Measure the mobile station simulator output power at each frequency step of the CW tone.

The results obtained shall be compared to the limits in clause 4.2.6.2 in order to prove compliance.

### 5.3.6 Intermodulation spurious response attenuation

Refer to TIA/EIA-97-D [4], figure 6.5.1-4 for a functional block diagram of the test setup.

- 1) Configure the base station under test and a mobile station simulator as shown in TIA/EIA-97-D [4], figure 6.5.1-4.
- 2) Configure the base station to operate in band class 6 and perform steps 3 through 11.
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) If the base station supports demodulation of Radio Configuration 1, 2, 3, or 4, set up a call using Fundamental Channel Test Mode 1 or 3 or Dedicated Control Channel Test Mode 3 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 6 through 11.
- 5) If the base station supports demodulation of Radio Configuration 5 or 6, set up a call using Fundamental Channel Test Mode 7 or Dedicated Control Channel Test Mode 7 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 6 through 11.

- 6) Transmit random data to the mobile station simulator at full data rate.
- 7) Measure the mobile station simulator output power.
- 8) If the base station is operating with Spreading Rate 1 perform steps 10 and 11 with the CW generators adjusted to offsets of +1,25 MHz and +2,05 MHz, and -1,25 MHz and -2,05 MHz from the CDMA frequency assignment.
- 9) If the base station is operating with Spreading Rate 3, perform steps 10 and 11 with the CW generators adjusted to offsets of +2,50 MHz and +3,30 MHz, and -2,50 MHz and -3,30 MHz from the CDMA frequency assignment.
- 10) Adjust the CW generator powers to be 70 dB above the mobile station simulator output power at the RF input ports as measured in step 7.
- 11) Measure the mobile station simulator output power and the FER of the base station receiver.

The results obtained shall be compared to the limits in clause 4.2.7.2 in order to prove compliance.

### 5.3.7 Adjacent channel selectivity

Refer to TIA/EIA-97-D [4], figure 6.5.1-8 for a functional block diagram of the test setup.

- 1) Configure the base station under test and a mobile station simulator as shown in TIA/EIA-97-D [4], figure 6.5.1-8.
- 2) Configure the base station to operate in Band Class 6 and perform steps 3 through 11.
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) If the base station supports demodulation of Radio Configuration 1 or 2, set up a call using Fundamental Channel Test Mode 1 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 11.
- 5) If the base station supports demodulation of Radio Configuration 3 or 4, set up a call using Fundamental Channel Test Mode 3 or Dedicated Control Channel Test Mode 3 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 11.
- 6) If the base station supports demodulation of Radio Configuration 5 or 6, set up a call using Fundamental Channel Test Mode 7 or Dedicated Control Channel Test Mode 7 (see TIA/EIA-97-D [4], clause 1.3) and perform steps 7 through 11.
- 7) Transmit random data to the mobile station simulator at full data rate.
- 8) Measure the mobile station simulator output power.
- 9) If the base station is operating with Spreading Rate 1, perform step 11 with the mobile station simulator for the interferer adjusted to offsets of +2,5 MHz and -2,5 MHz from the CDMA frequency assignment with an output power of -53 dBm. The mobile station simulator shall be one mobile station transmitting a full rate RC 3 signal.
- 10) If the base station is operating with Spreading Rate 3, perform step 11 with the mobile station simulator for the interferer adjusted to offsets of +5 MHz and -5 MHz from the CDMA frequency assignment with an output power of -49 dBm. The mobile station simulator shall be one mobile station transmitting a full rate RC 5 signal.
- 11) Measure the mobile station simulator output power and FER of the base station receiver.

The results obtained shall be compared to the limits in clause 4.2.8.2 in order to prove compliance.

## Annex A (normative): The EN Requirements Table (EN-RT)

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the EN-RT proforma in this annex so that it can be used for its intended purposes and may further publish the completed EN-RT.

The EN Requirements Table (EN-RT) serves a number of purposes, as follows:

- it provides a tabular summary of all the requirements;
- it shows the status of each EN-R, whether it is essential to implement in all circumstances (Mandatory), or whether the requirement is dependent on the supplier having chosen to support a particular optional service or functionality (Optional). In particular it enables the EN-Rs associated with a particular optional service or functionality to be grouped and identified;
- when completed in respect of a particular equipment it provides a means to undertake the static assessment of conformity with the EN.

**Table A.1: EN Requirements Table (EN-RT)**

EN Reference		EN 301 908-5				Comment
No.	Reference	EN-R (note)	Status			
1	4.2.2	Transmitter conducted spurious emissions	M			
2	4.2.3	Maximum output power	M			
3	4.2.4	Inter-base station transmitter intermodulation	M			
4	4.2.5	Receiver conducted spurious emissions	M			
5	4.2.6	Receiver blocking characteristics	M			
6	4.2.7	Intermodulation spurious response attenuation	M			
7	4.2.8	Adjacent channel selectivity	M			

NOTE: These EN-Rs are justified under article 3.2 of the R&TTE Directive.

### Key to columns:

**No** Table entry number;

**Reference** Clause reference number of conformance requirement within the present document;

**EN-R** Title of conformance requirement within the present document;

**Status** Status of the entry as follows:

M Mandatory, shall be implemented under all circumstances;

O Optional, may be provided, but if provided shall be implemented in accordance with the requirements;

O.n this status is used for mutually exclusive or selectable options among a set. The integer "n" shall refer to a unique group of options within the EN-RT. A footnote to the EN-RT shall explicitly state what the requirement is for each numbered group. For example, "It is mandatory to support at least one of these options", or, "It is mandatory to support exactly one of these options".

**Comments** To be completed as required.

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## Annex B (informative): Environmental profile and standard test conditions

### B.1 Introduction

The following clause contains a copy of the description of environmental requirements as specified in TIA/EIA-97-D [4], clause 5, and a definition of standard test conditions. This should provide some guidance on how the environmental profile can be declared for the purpose of the present document.

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### B.2 CDMA environmental requirements

#### B.2.1 Temperature and power supply voltage

##### B.2.1.1 Definition

The temperature and voltage ranges denote the ranges of ambient temperature and power supply input voltages over which the base station will operate and meet the requirements of the present document. The ambient temperature is the average temperature of the air surrounding the base station equipment. The power supply voltage is the voltage applied at the input terminals of the base station equipment. The manufacturer is to specify the temperature range and the power supply voltage over which the equipment is to operate.

##### B.2.1.2 Method of measurement

The base station equipment shall be installed in its normal configuration (i.e., in its normal cabinet or rack mounting arrangement with all normally supplied covers installed) and placed in a temperature chamber. Optionally, the equipment containing the frequency determining element(s) may be placed in the temperature chamber if the frequency stability is to be maintained over a different temperature from that specified for the rest of the base-station equipment.

The temperature chamber shall be stabilized at the manufacturer's highest specified operating temperature and then shall be operated in accordance with the standard duty cycle test conditions specified in TIA/EIA-97-D [4], clause 6, and over the power supply input voltage range specified by the manufacturer. With the base station equipment operating, the temperature is to be maintained at the specified test temperature without forced circulation of air from the temperature chamber being directly applied to the base station equipment.

During the entire duty cycle, the transmitter frequency accuracy, timing reference, output power, and waveform quality shall be measured as specified in TIA/EIA-97-D [4], clause 4.

Turn the base station equipment off, stabilize the equipment in the chamber at room temperature, and repeat the above measurements after a 15 minute standby warm up period.

Turn the base station equipment off, stabilize the equipment in the chamber at the coldest operating temperature specified by the manufacturer, and repeat the above measurements above after a 15 minute standby warm up period.

For transmitter frequency stability measurements, the above procedure shall be repeated every 10°C over the operating temperature range specified by the manufacturer. The equipment shall be allowed to stabilize at each step before a frequency measurement is made.

##### B.2.1.3 Minimum standard

Over the ambient temperature and power supply ranges specified by the manufacturer, the operation of the base station equipment shall conform to the limits shown in table B.1.

**Table B.1: Environmental test limits**

Parameter	Limit	Reference in TIA/EIA-97-D [4]
Frequency Tolerance	$\pm 0,05$ ppm	4.1.2
Time Reference	$\pm 10$ ms	4.2.1.1
Pilot Waveform Quality	$\rho > 0,912$	4.2.2
RF Power Output Variation	+2 dB, -4 dB	4.3.1

## B.2.2 High humidity

### B.2.2.1 Definition

The term "high humidity" denotes the relative humidity at which the base station will operate with no more than a specified amount of degradation in performance.

### B.2.2.2 Method of measurement

The base station equipment, after having been adjusted for normal operation under standard test conditions, shall be placed, inoperative (i.e. switched off), in a humidity chamber with the humidity maintained at 0,024 gm H<sub>2</sub>O/g Dry Air at 50 °C (40 % relative humidity) for a period of not less than eight hours. While in the chamber and at the end of this period, the base station shall be switched on and its transmitting equipment shall be tested for frequency accuracy, timing reference, output power, and waveform quality. No readjustment of the base station equipment shall be allowed during this test.

### B.2.2.3 Minimum standard

Under the above humidity conditions, the operation of the base station equipment shall conform to the limits specified in table B.1.

## B.3 Standard test conditions

### B.3.1 Standard environmental test conditions

Measurements under standard atmospheric conditions should be carried out under any combination of the following conditions:

- Temperature: +15 °C to +35 °C;
- Relative humidity: 45 % to 75 %;
- Air pressure: 86 000 Pa to 106 000 Pa (860 mbar to 1 060 mbar).

If desired, the results of the measurements can be corrected by calculation to the standard reference temperature of 25 °C and the standard reference air pressure of 101 300 Pa (1 013 mbar).

### B.3.2 Standard conditions for the primary power supply

#### B.3.2.1 General

The standard test voltages should be those specified by the manufacturer, or an equivalent type that duplicates the voltage, impedance, and ampere hours (if relevant for the measurement) of the recommended supply.

### B.3.2.2 Standard DC test voltage from accumulator batteries

The standard (or nominal) DC test voltage specified by the manufacturer should be equal to the standard test voltage of the type of accumulator to be used, multiplied by the number of cells minus an average DC power cable loss value, that the manufacturer determines as being typical (or applicable) for a given installation. Since accumulator batteries may or may not be under charge or may be in a state of discharge when the equipment is being operated, the manufacturer should also test the equipment at anticipated voltage extremes above and below the standard voltage. The test voltages should not deviate from the stated values by more than  $\pm 2$  % during a series of measurements carried out as part of a single test on the same equipment.

### B.3.2.3 Standard AC voltage and frequency

For equipment that operates from the AC mains, the standard AC test voltage should be equal to the nominal voltage specified by the manufacturer. If the equipment is provided with different input taps, the one designated "nominal" should be used. The standard test frequency and the test voltage should not deviate from their nominal values by more than  $\pm 2$  %.

The equipment should operate without degradation with input voltage variations of up to  $\pm 10$  %, and should maintain its specified transmitter frequency stability for input voltage variations of up to  $\pm 15$  %. The frequency range over which the equipment is to operate should be specified by the manufacturer.

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## Annex C (informative): Bibliography

ETSI TR 100 028 (V1.3.1): "Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.



## Annex D (informative): The EN title in the official languages

Language	EN title
Danish	
Dutch	
English	Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS) and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 5: Harmonized standard for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS) covering essential requirements of article 3.2 of the R&TTE Directive
Finnish	
French	Compatibilité électromagnétique et Radioélectrique (ERM); Stations de Base (BS) et Equipement Utilisateur (UE) pour les réseaux cellulaires de troisième génération IMT-2000; Partie 5: Norme harmonisée pour l'IMT-2000, CDMA Multi-porteuse (CDMA 2000) (BS) couvrant les exigences essentielles de l'article 3.2 de la Directive R&TTE.
German	Elektromagnetische Verträglichkeit und Funkspektrumangelegenheiten (ERM); Basis- (BS) und Mobilstationen (UE) für zellulare Mobilfunknetze der dritten Generation IMT-2000; Teil 5: CDMA Mehrfachträger (cdma2000) (BS), Harmonisierte Europäische Norm (EN) für IMT-2000 mit wesentlichen Anforderungen nach R&TTE Richtlinie Artikel 3.2
Greek	
Icelandic	
Italian	Compatibilità elettromagnetica e problematiche di Spettro Radio (ERM); Stazioni Base (BS) e Terminali Mobili (UE) per le reti cellulari di terza generazione IMT-2000; Parte 5: Norma armonizzata per IMT-2000, CDMA Multi-Portante (cdma2000) (BS) relativa ai requisiti essenziali dell'articolo 3.2 della Direttiva R&TTE
Portuguese	
Spanish	Compatibilidad electromagnética y espectro radio (ERM); estaciones base (BS) y equipos de usuario (UE) de redes móviles de tercera generación IMT-2000; EN armonizada que cubre los requisitos mínimos del artículo 3.2 de la directiva de R&TTE (1999/5/EC); parte 5: CDMA multi portadora (cdma2000) (BS)
Swedish	

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## History

<b>Document history</b>			
V1.1.1	April 2001	Public Enquiry	PE 20010824: 2001-04-25 to 2001-08-24
V1.1.1	November 2001	Vote	V 20020104: 2001-11-05 to 2002-01-04